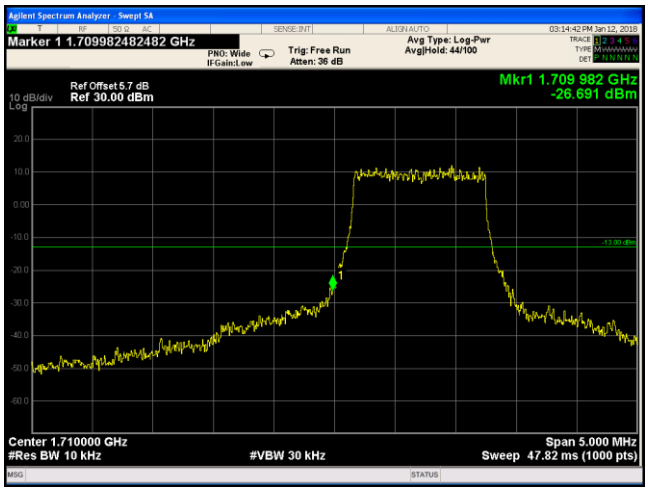
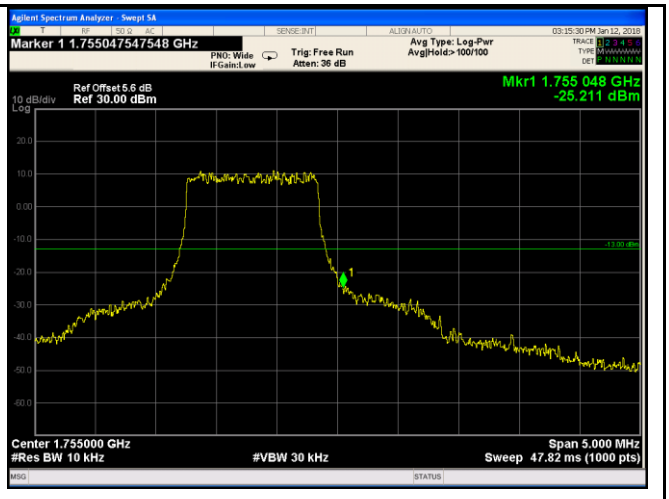
LTE Band IV (Part 27)



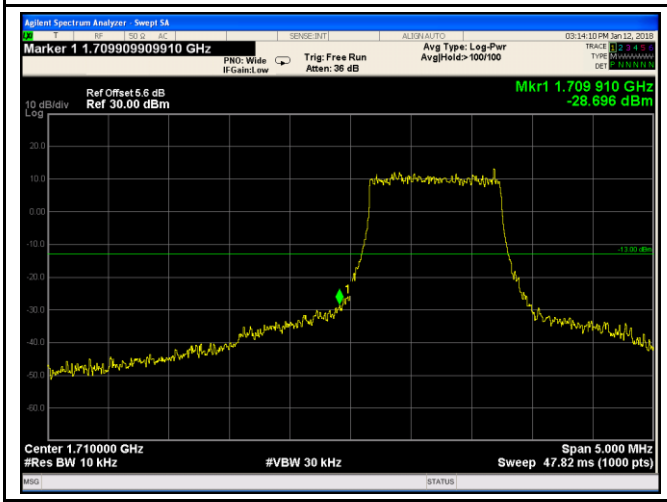
LTE Band IV - Low Channel QPSK-1.4

Note: Offset=Cable loss (4.5) + 10log (13.18/10)=4.5+1.2=5.7 dB



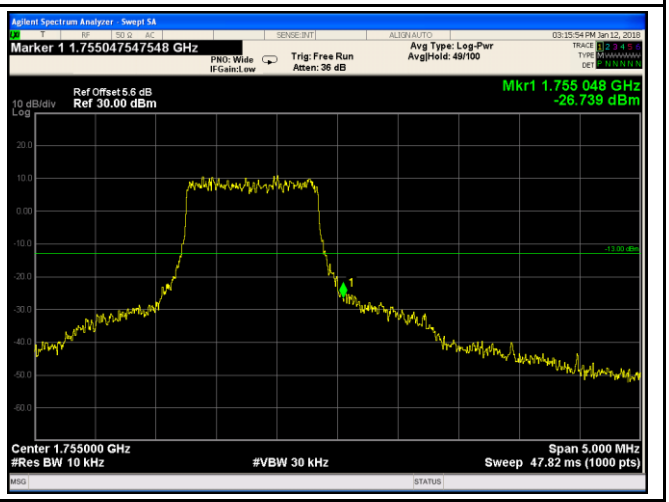
LTE Band IV - High Channel QPSK-1.4

Note: Offset=Cable loss (4.5) + 10log (12.90/10)=4.5+1.1=5.6 dB



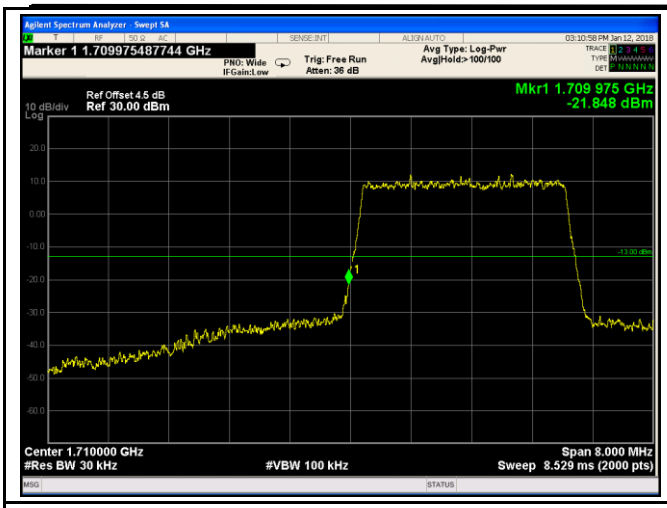
LTE Band IV - Low Channel 16QAM-1.4

Note: Offset=Cable loss (4.5) + 10log (13.02/10)=4.5+1.1=5.6 dB

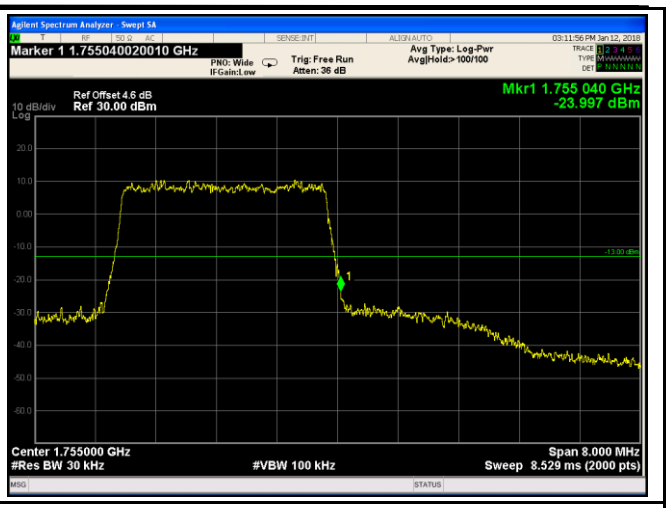


LTE Band IV - High Channel 16QAM-1.4

Note: Offset=Cable loss (4.5) + 10log (12.95/10)=4.5+1.1=5.6 dB



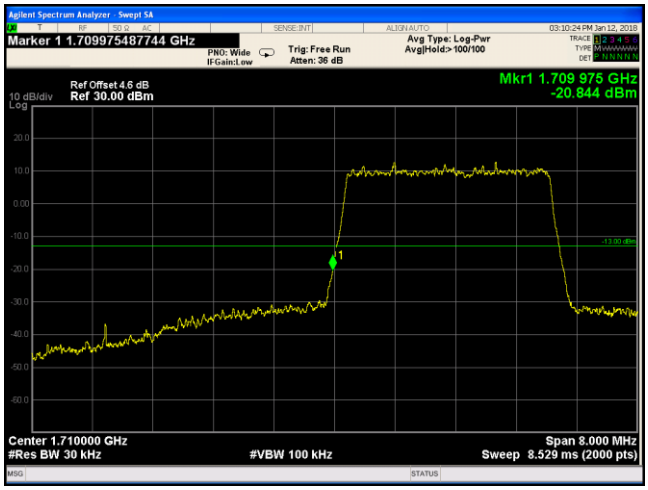
LTE Band IV - Low Channel QPSK-3



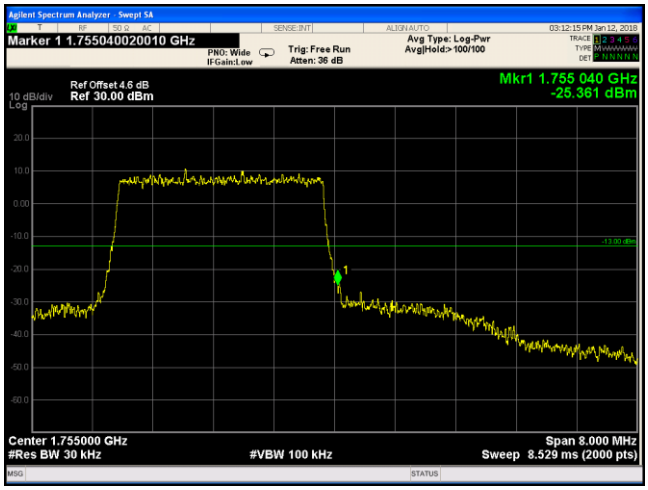
LTE Band IV - High Channel QPSK-3

Note: Offset=Cable loss (4.5) + 10log (30.21/30)=4.5+0.0=4.5 dB

Note: Offset=Cable loss (4.5) + 10log (30.77/30)=4.5+0.10=4.6 dB



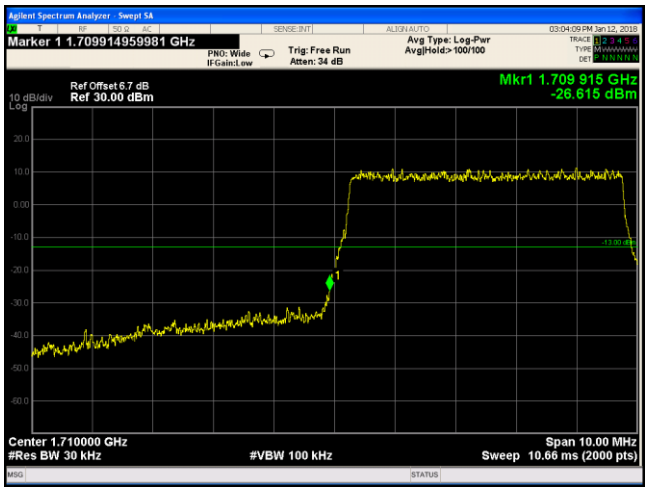
LTE Band IV - Low Channel 16QAM-3



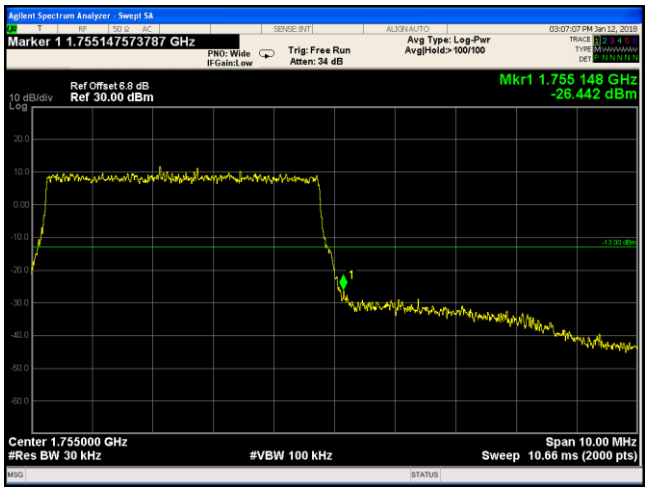
LTE Band IV - High Channel 16QAM-3

Note: Offset=Cable loss (4.5) + 10log (30.58/30)=4.5+0.1=4.6 dB

Note: Offset=Cable loss (4.5) + 10log (30.76/30)=4.5+0.0=4.5 dB

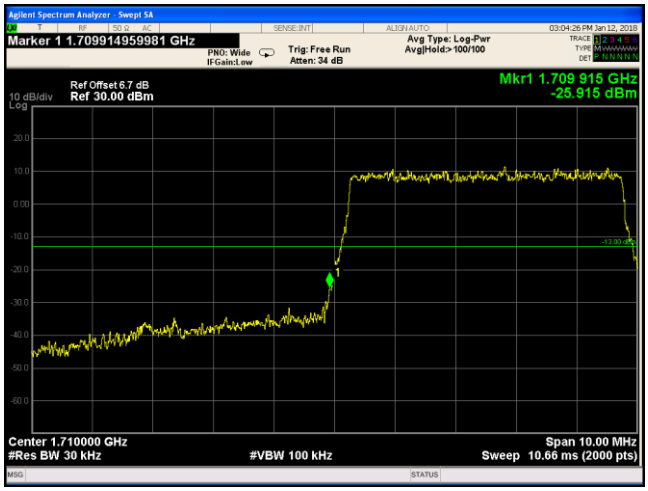


LTE Band IV - Low Channel QPSK-5



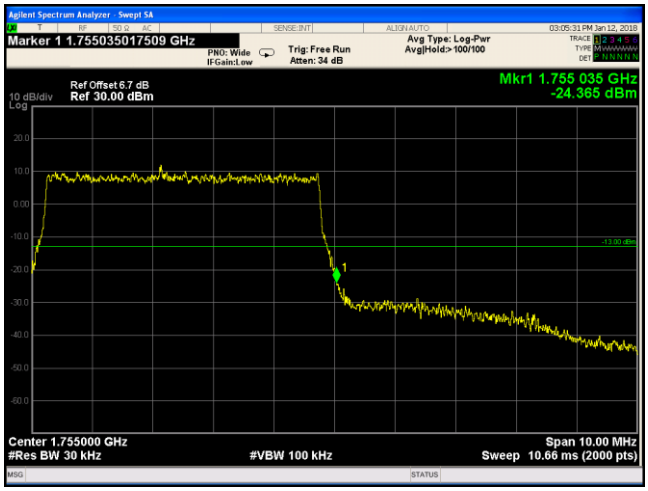
LTE Band IV - High Channel QPSK-5

Note: Offset=Cable loss (4.5) + 10log (49.62/30)=4.5+2.2=6.7 dB



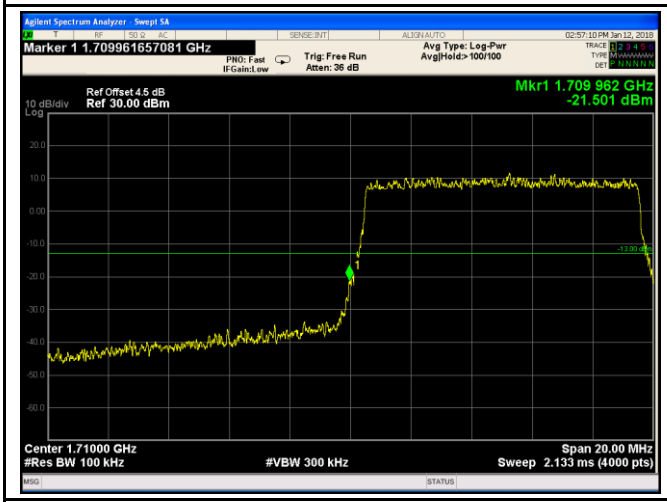
LTE Band IV - Low Channel 16QAM-5

Note: Offset=Cable loss (4.5) + 10log (50.40/30)=4.5+2.2=6.7 dB



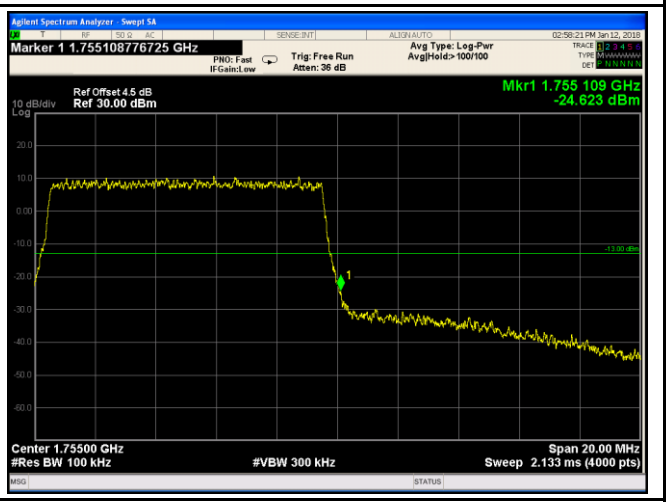
LTE Band IV - High Channel 16QAM-5

Note: Offset=Cable loss (4.5) + 10log (50.35/30)=4.5+2.2=6.7 dB

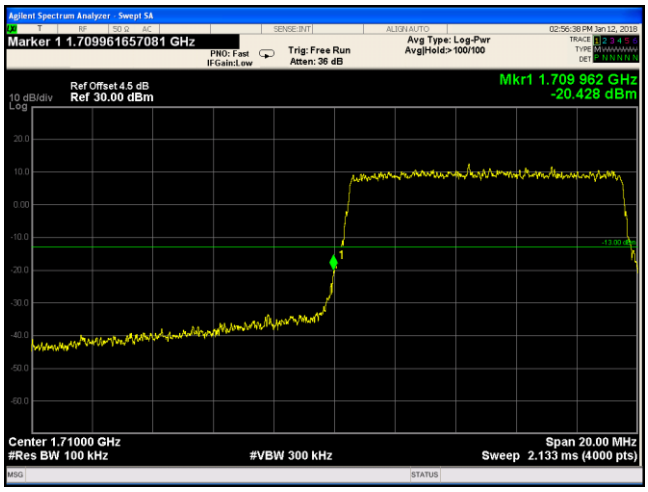


LTE Band IV - Low Channel QPSK-10

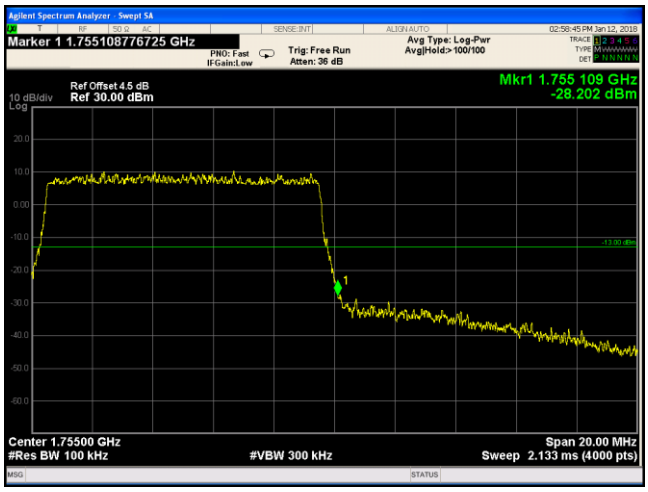
Note: Offset=Cable loss (4.5) + 10log (50.05/30)=4.5+2.2=6.7 dB



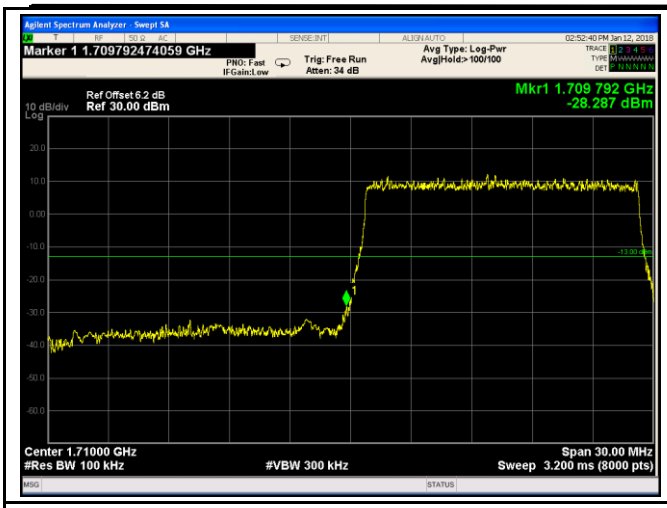
LTE Band IV - High Channel QPSK-10



LTE Band IV - Low Channel 16QAM-10



LTE Band IV - High Channel 16QAM-10

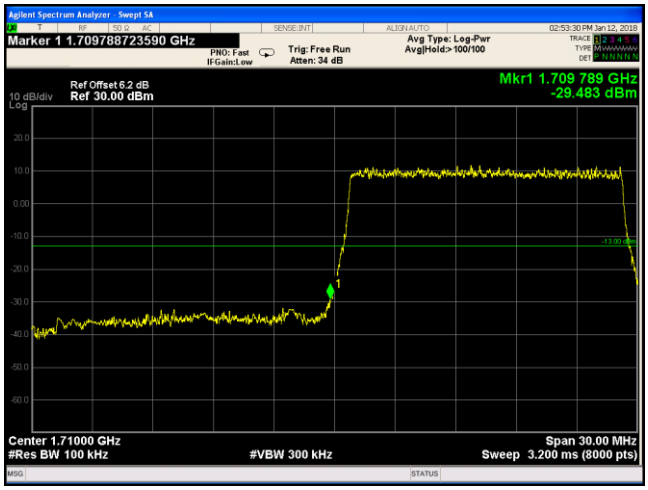


LTE Band IV - Low Channel QPSK-15

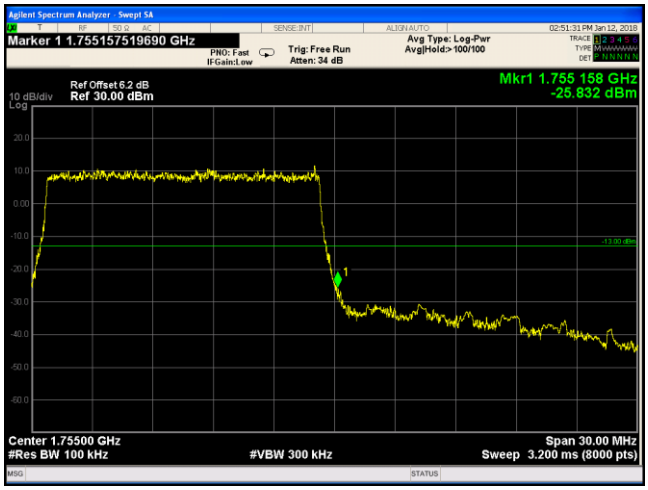
LTE Band IV - High Channel QPSK-15

Note: Offset=Cable loss (4.5) + 10log (146.5/100)=4.5+1.7=6.2 dB

Note: Offset=Cable loss (4.5) + 10log (145.6/100)=4.5+1.7=6.2 dB



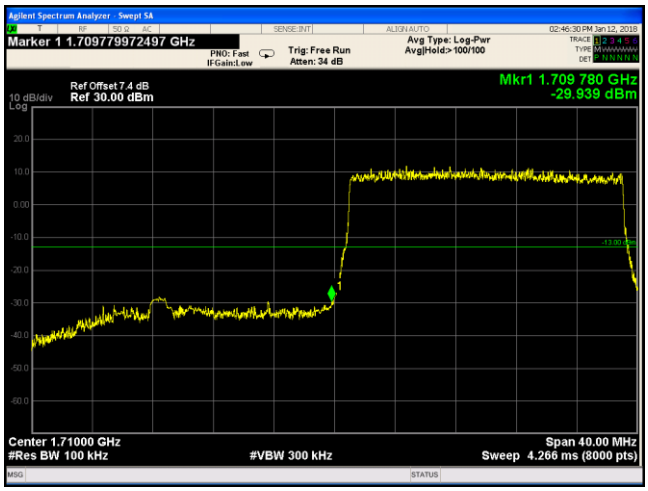
LTE Band IV - Low Channel 16QAM-15



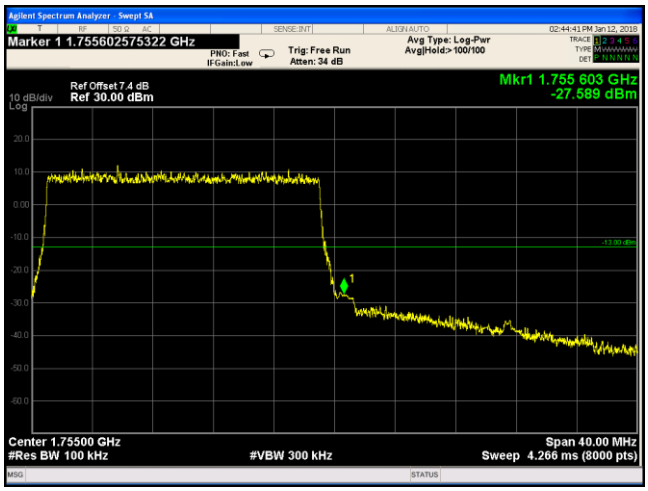
LTE Band IV - High Channel 16QAM-15

Note: Offset=Cable loss (4.5) + 10log (146/100)=4.5+1.6=6.2 dB

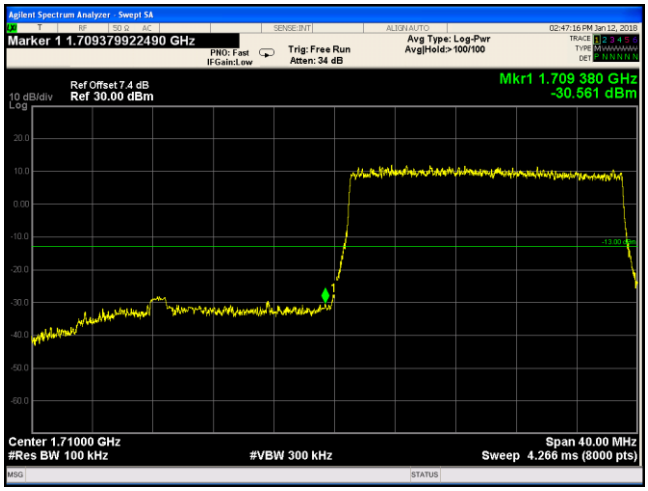
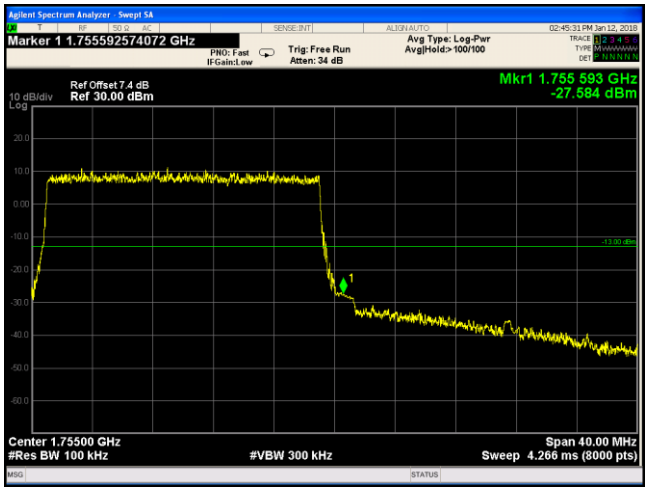
Note: Offset=Cable loss (4.5) + 10log (147/100)=4.5+1.7=6.2 dB



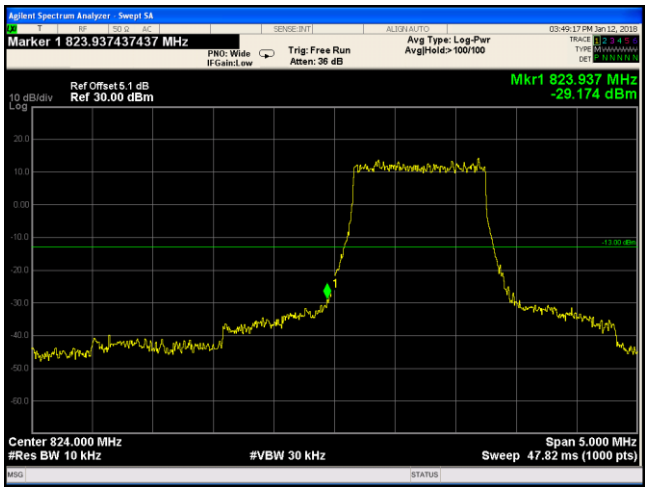
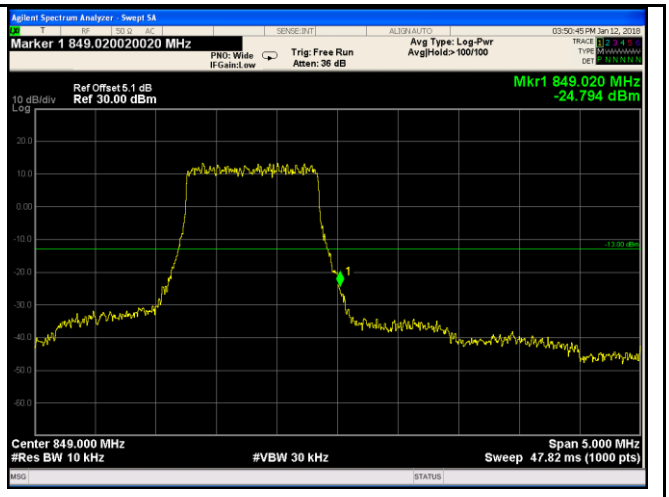
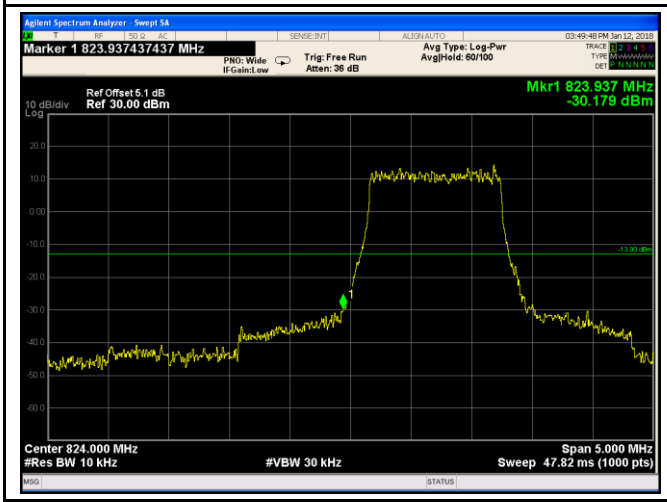
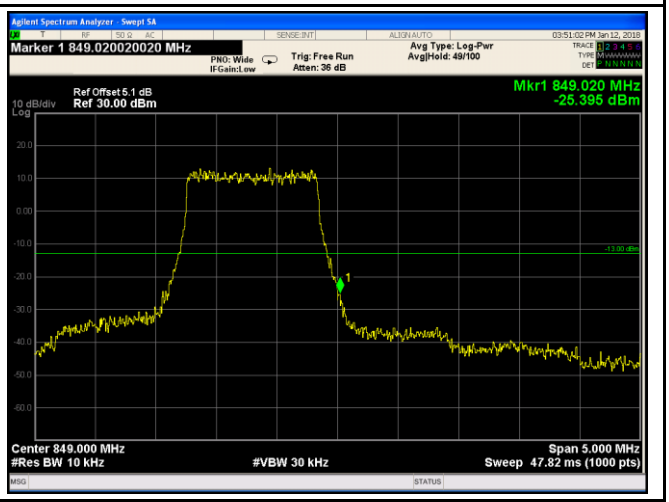
LTE Band IV - Low Channel QPSK-20

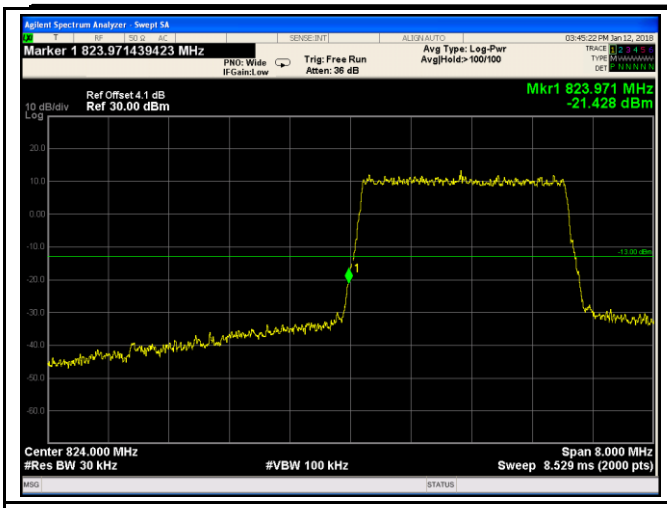


LTE Band IV - High Channel QPSK-20

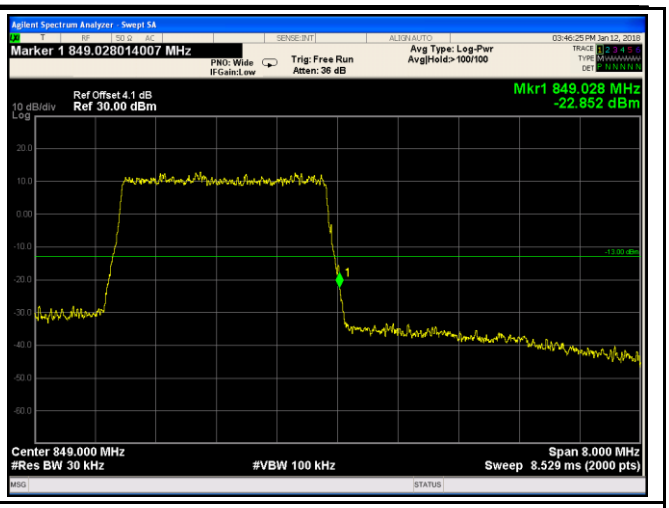
Note: Offset=Cable loss (4.5) + 10log (192/100)=4.5+2.9=7.4 dB	Note: Offset=Cable loss (4.5) + 10log (193/100)=4.5+2.9=7.4 dB
	
LTE Band IV - Low Channel 16QAM-20	LTE Band IV - High Channel 16QAM-20
Note: Offset=Cable loss (4.5) + 10log (173/100)=4.5+2.9=7.4dB	Note: Offset=Cable loss (4.5) + 10log (193/100)=4.5+2.9=7.4 dB

LTE Band V (Part 22H)

	
LTE Band V - Low Channel QPSK-1.4	LTE Band V - High Channel QPSK-1.4
Note: Offset=Cable loss (4.5) + 10log (13.31/10)=4.5+0.6=5.1 dB	Note: Offset=Cable loss (4.5) + 10log (13.01/10)=4.5+0.6=5.1 dB
	
LTE Band V - Low Channel 16QAM-1.4	LTE Band V - High Channel 16QAM-1.4
Note: Offset=Cable loss (4.5) + 10log (13.16/10)=4.5+0.6=5.1dB	Note: Offset=Cable loss (4.5) + 10log (13.08/10)=4.5+0.6=5.1 dB



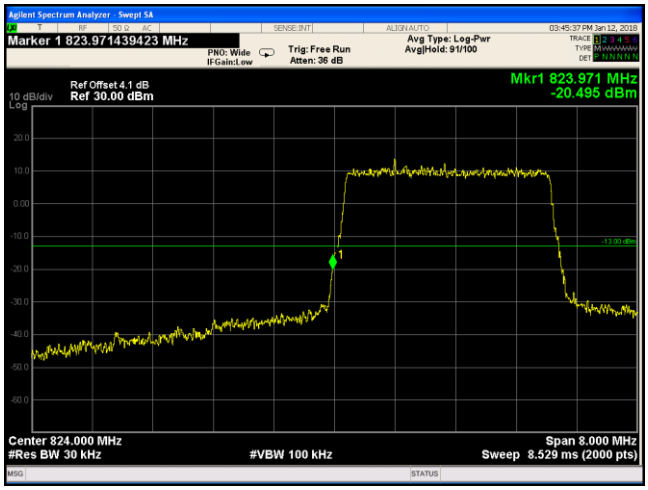
LTE Band V - Low Channel QPSK-3



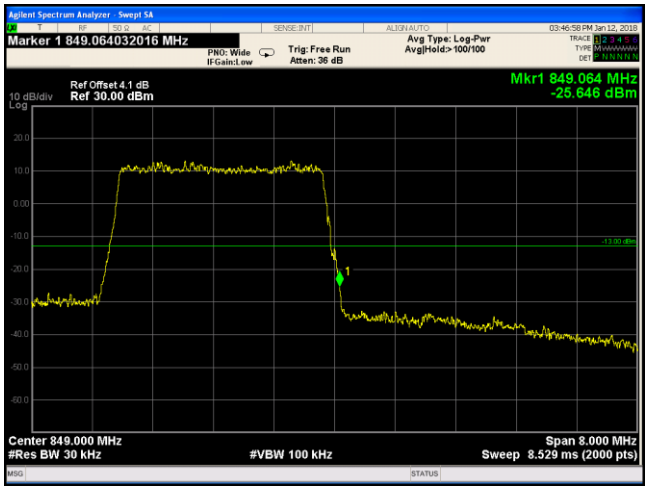
LTE Band V - High Channel QPSK-3

Note: Offset=Cable loss (4.5) + 10log (30.52/30)=4.0+0.1=4.1 dB

Note: Offset=Cable loss (4.5) + 10log (30.78/30)=4.0+0.1=4.1 dB



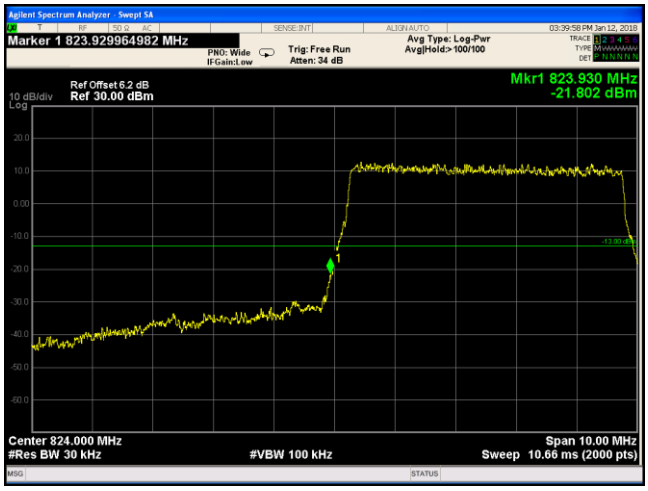
LTE Band V - Low Channel 16QAM-3



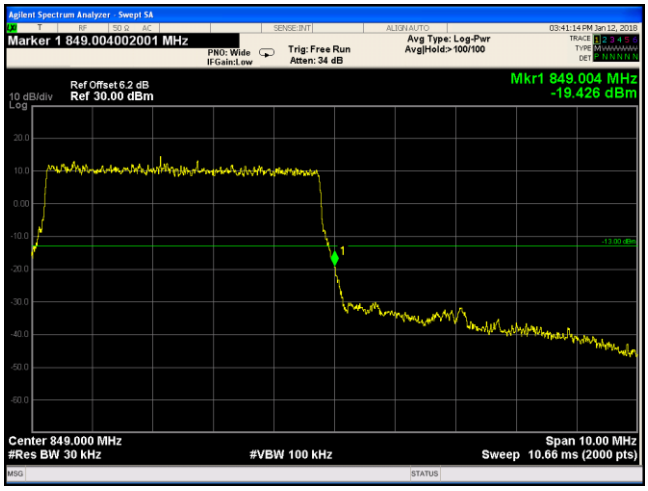
LTE Band V - High Channel 16QAM-3

Note: Offset=Cable loss (4.5) + 10log (30.50/30)=4.0+0.1=4.1 dB

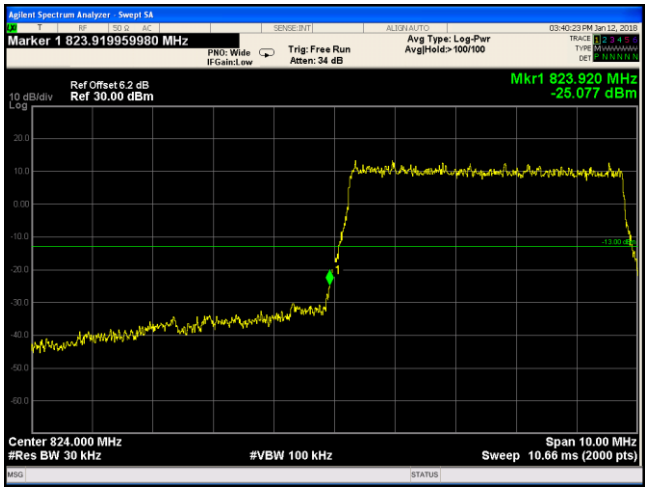
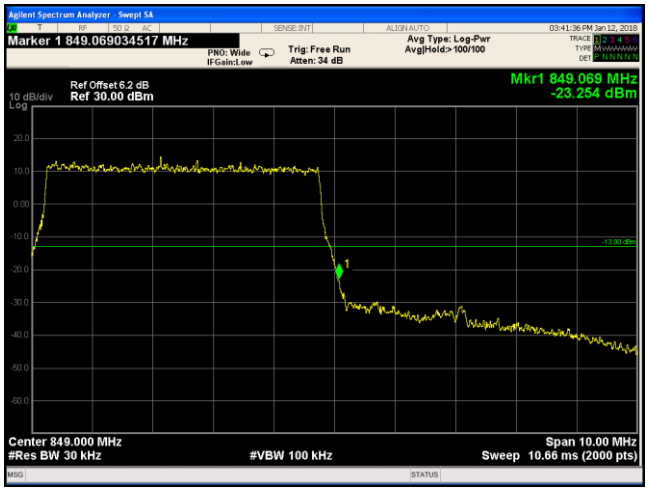
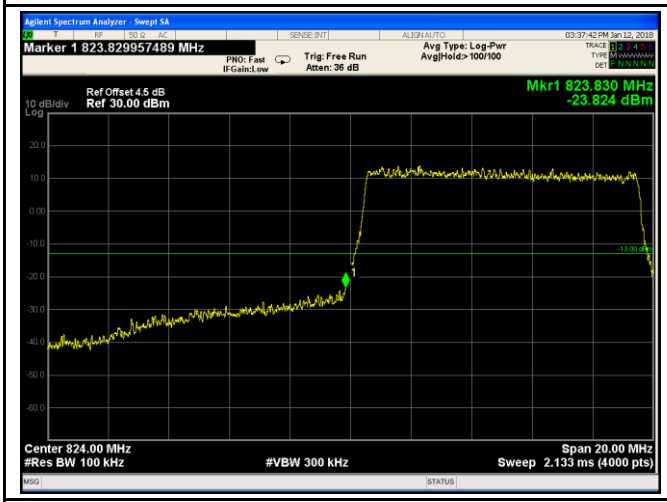
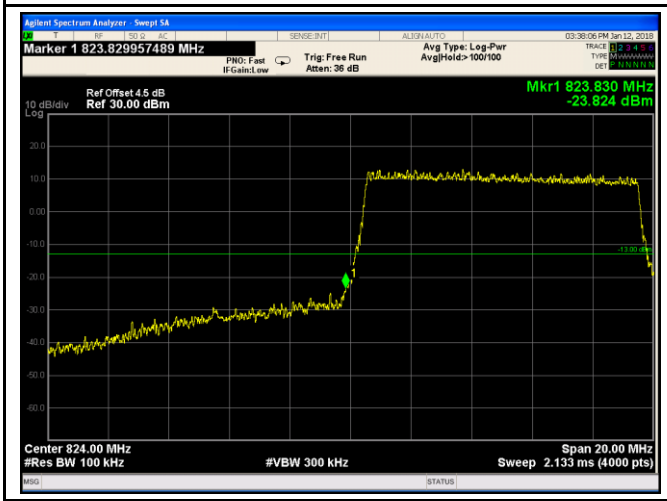
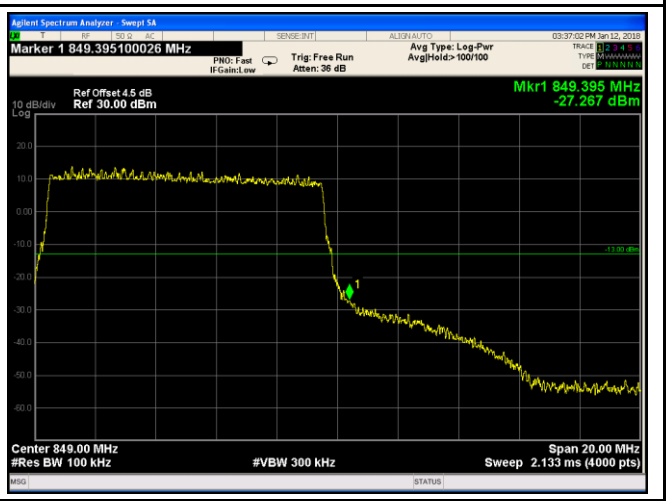
Note: Offset=Cable loss (4.5) + 10log (30.88/30)=4.0+0.1=4.1 dB



LTE Band V - Low Channel QPSK-5



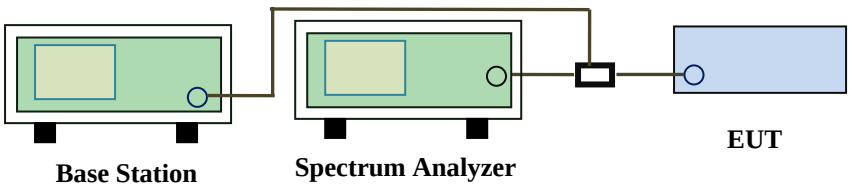
LTE Band V - High Channel QPSK-5

Note: Offset=Cable loss (4.5) + 10log (49.60/30)=4.0+2.2=6.2 dB	Note: Offset=Cable loss (4.5) + 10log (50.40/30)=4.0+2.2=6.2 dB
	
LTE Band V - Low Channel 16QAM-5	LTE Band V - High Channel 16QAM-5
Note: Offset=Cable loss (4.5) + 10log (49.86/30)=4.0+2.2=6.2 dB	Note: Offset=Cable loss (4.5) + 10log (50.31/30)=4.0+2.2=6.2dB
	
LTE Band V - Low Channel QPSK-10	LTE Band V - High Channel QPSK-10
	
LTE Band V - Low Channel 16QAM-10	LTE Band V - High Channel 16QAM-10

6.8 Band Edge 27.53(m)

Temperature	---
Relative Humidity	---
Atmospheric Pressure	---
Test date :	---
Tested By :	---

Requirement(s):

Spec	Requirement	Applicable
§27.53(m)	According to FCC 27.53(m)(4) specified that power of any emmission ouutside of the channel edge must be attenuated below the transmitting power(P) by a factor shall be not less than 43+10log (P)dB at the channel edge, the limit of emission equal to -13dBm. And 55+10log (P)dB at 5.5MHz from the channel edges, the limit of emission equal to -25dBm. In the 1MHz bands immediately outside and adjacent to the frenqency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed.	☐
Test Setup		
Test Procedure	- The EUT was connected to Spectrum Analyzer and Base Station via power divider. - The 99% and 26 dB occupied bandwidth (BW) of the middle channel for the highest RF powers.	
Remark		
Result	☐ Pass ☐ Fail ☑ N/A	

Test Data ☐ Yes ☑ N/A

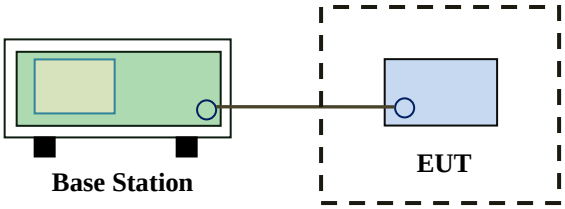
Test Plot ☐ Yes (See below) ☑ N/A

6.9 Frequency Stability

Temperature	25℃
Relative Humidity	57%
Atmospheric Pressure	1023mbar
Test date :	January 27, 2018
Tested By :	Aaron Liang

Requirement(s):

<table>
<tr><th>Spec</th><th>Item</th><th>Requirement</th><th>Applicable</th></tr>
<tr><td>§2.1055, §22.355 & §24.235 § 27.5(h); § 27.54</td><td>a)</td><td>According to §22.355, the carrier frequency of each transmitter in the Public Mobile Services must be maintained within the tolerances given in Table below:
Frequency Tolerance for Transmitters in the Public Mobile Services
<table>
<tr><th>Frequency Range (MHz)</th><th>Base, fixed (ppm)</th><th>Mobile ≤ 3 watts (ppm)</th><th>Mobile ≤ 3 watts (ppm)</th></tr>
<tr><td>25 to 50</td><td>20.0</td><td>20.0</td><td>50.0</td></tr>
<tr><td>□□to 450</td><td>5.0</td><td>5.0</td><td>50.0</td></tr>
<tr><td>450 to 512</td><td>2.5</td><td>5.0</td><td>5□0</td></tr>
<tr><td>821 to 896</td><td>1.5</td><td>2.5</td><td>2.5</td></tr>
<tr><td>928 to 929.</td><td>5.0</td><td>N/A</td><td>N/A</td></tr>
<tr><td>929 to 960.</td><td>1.5</td><td>N/A</td><td>N/A</td></tr>
<tr><td>2110 to 2220</td><td>10.0</td><td>N/A</td><td>N/A</td></tr>
</table>
According to §24.235, the frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized frequency block.
According to §27.54, The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.</td><td>☑</td></tr>
</table>

Test setup	
Procedure	A communication link was established between EUT and base station. The frequency error was monitored and measured by base station under variation of ambient temperature and variation of primary supply voltage. Limit: The frequency stability of the transmitter shall be maintained within ±0.00025% (±2.5ppm) of the center frequency.
Remark	Frequency Stability versus Temperature: The Frequency tolerance of the carrier signal shall be maintained within 2.5ppm of the operating frequency over a temperature variation of -10ºC to +55ºC at normal supply voltage.
Result	☑ Pass ☐ Fail

Test Data ☑ Yes ☐ N/A

Test Plot ☐ Yes (See below) ☑ N/A

LTE Band II (Part 24E) result

Middle Channel, f_o = 1880 MHz				
Temperature (℃)	Power Supplied (V_{DC})	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)
-10	3.85	-12	0.0064	2.5
0		-12	0.0064	2.5
10		-13	0.0069	2.5
20		-14	0.0074	2.5
30		-15	0.0080	2.5
40		-10	0.0053	2.5
50		-17	0.0090	2.5
55		-13	0.0069	2.5
25	4.4	-14	0.0074	2.5
	3.6	-14	0.0074	2.5

LTE Band IV (Part 27) result

Middle Channel, f_o = 1732.5 MHz				
Temperature (℃)	Power Supplied (V_{DC})	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)
-10	7.4	-12	0.0069	2.5
0		-8	0.0046	2.5
10		-12	0.0069	2.5
20		-14	0.0081	2.5
30		-10	0.0058	2.5
40		-16	0.0092	2.5
50		-15	0.0087	2.5
55		-17	0.0098	2.5
25	7.9	-15	0.0087	2.5
	6.9	-10	0.0058	2.5

LTE Band V (Part 22H) result

Middle Channel, f_o = 836.5 MHz				
Temperature (℃)	Power Supplied (V_{DC})	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)
-10	7.4	-11	0.0043	2.5
0		-9	0.0036	2.5
10		-9	0.0036	2.5
20		-8	0.0032	2.5
30		-11	0.0043	2.5
40		-9	0.0036	2.5
50		-10	0.0039	2.5
55		-6	0.0024	2.5
25	7.9	-10	0.0039	2.5
	6.9	-12	0.0047	2.5

Annex A. TEST INSTRUMENT

Instrument	Model	Serial #	Cal Date	Cal Due	In use
RF Conducted Test					
Agilent ESA-E SERIES SPECTRUM ANALYZER	E4407B	MY45108319	09/14/2017	09/13/2018	☑
Power Splitter	1#	1#	08/30/2017	08/29/2018	☑
Universal Radio Communication Tester	CMU200	121393	09/23/2017	09/22/2018	☑
Temperature/Humidity Chamber	UHL-270	001	10/07/2017	10/06/2018	☑
DC Power Supply	E3640A	MY40004013	09/15/2017	09/14/2018	☑
RF Power Sensor	Dare RPR3006C/P/W	AY554013	09/15/2017	09/14/2018	☑
Radiated Emissions					
EMI test receiver	ESL6	100262	09/15/2017	09/14/2018	☑
OPT 010 AMPLIFIER (0.1-1300MHz)	8447E	2727A02430	08/30/2017	08/29/2018	☑
Horn Antenna	BBHA9170	3145226D1	09/27/2017	09/26/2018	☑
Microwave Preamplifier (1 ~ 26.5GHz)	8449B	3008A02402	03/23/2017	03/22/2018	☑
Bilog Antenna (30MHz~6GHz)	JB6	A110712	09/19/2017	09/18/2018	☑
Bilog Antenna (30MHz~2GHz)	JB1	A112017	09/19/2017	09/18/2018	☑
Double Ridge Horn Antenna (1 ~18GHz)	AH-118	71259	09/22/2017	09/21/2018	☑
Double Ridge Horn Antenna (1 ~18GHz)	AH-118	71283	09/22/2017	09/21/2018	☑
SYNTHESIZED SIGNAL GENERATOR	8665B	3744A01293	09/15/2017	09/14/2018	☑
Power Amplifier	SMC150D	R1553-0313	03/08/2017	03/07/2018	☑
Power Amplifier	S61-25	R1553-0516	05/26/2017	05/25/2018	☑
Power Amplifier	S41-25D	R1553-0314	05/26/2017	05/25/2018	☑

Tunable Notch Filter	3NF-800/1000-S	AA4	08/30/2017	08/29/2018	☑

Annex B. EUT And Test Setup Photographs

Annex B.i. Photograph: EUT External Photo

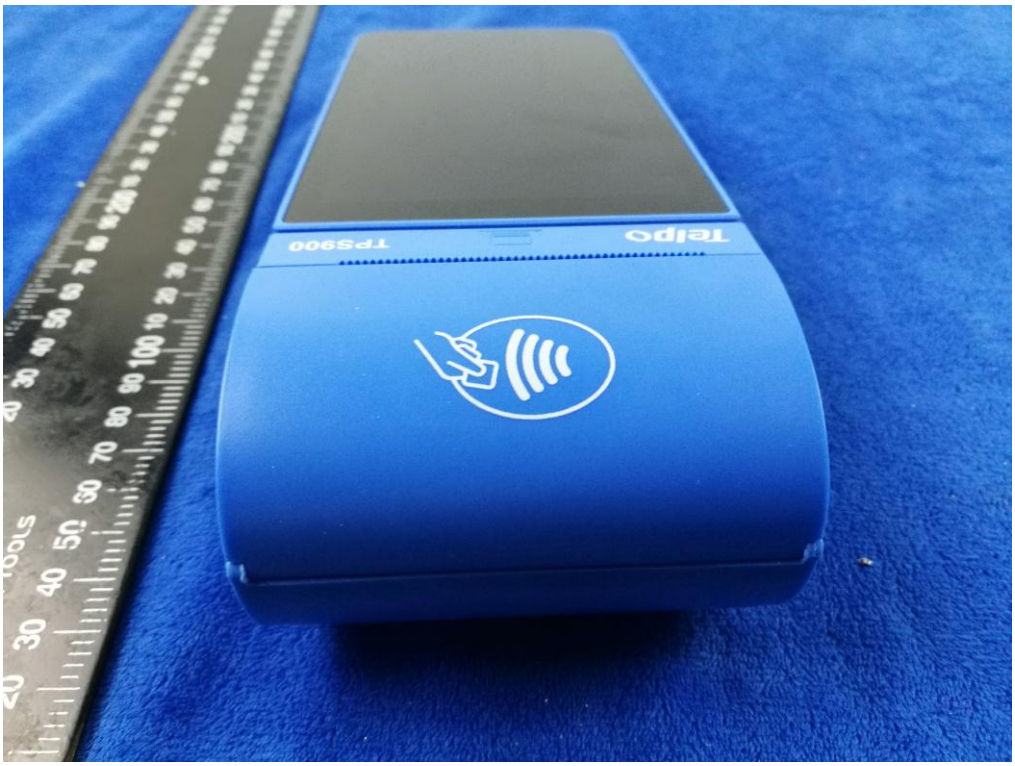
Whole Package View

Adapter - Lable View

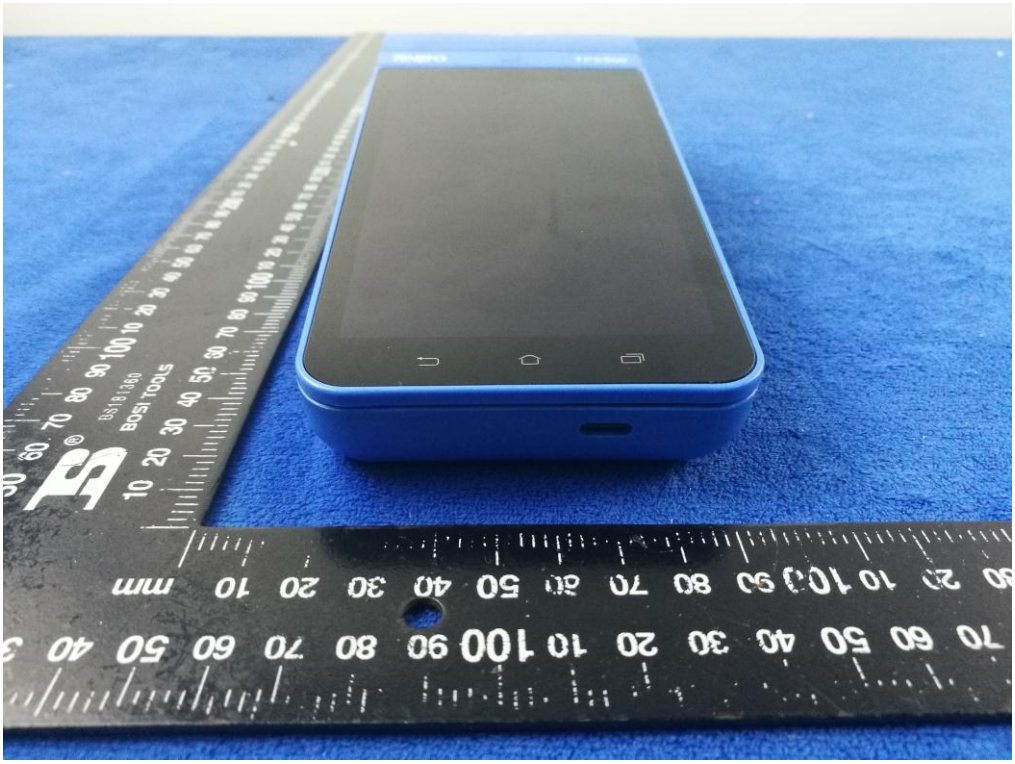
EUT - Front View

EUT - Rear View

EUT - Top View



EUT - Bottom View



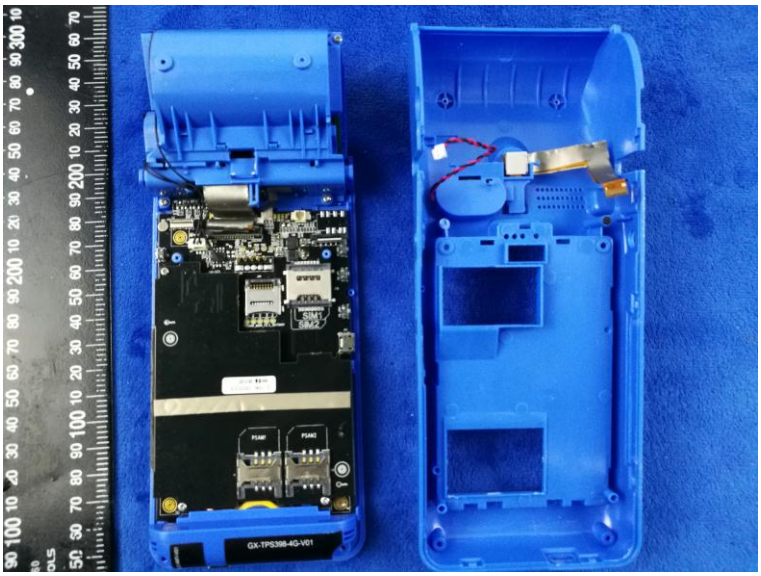
EUT - Left View

EUT - Right View

Annex B.ii. Photograph: EUT Internal Photo

Cover Off - Top View 1

Cover Off - Top View 2



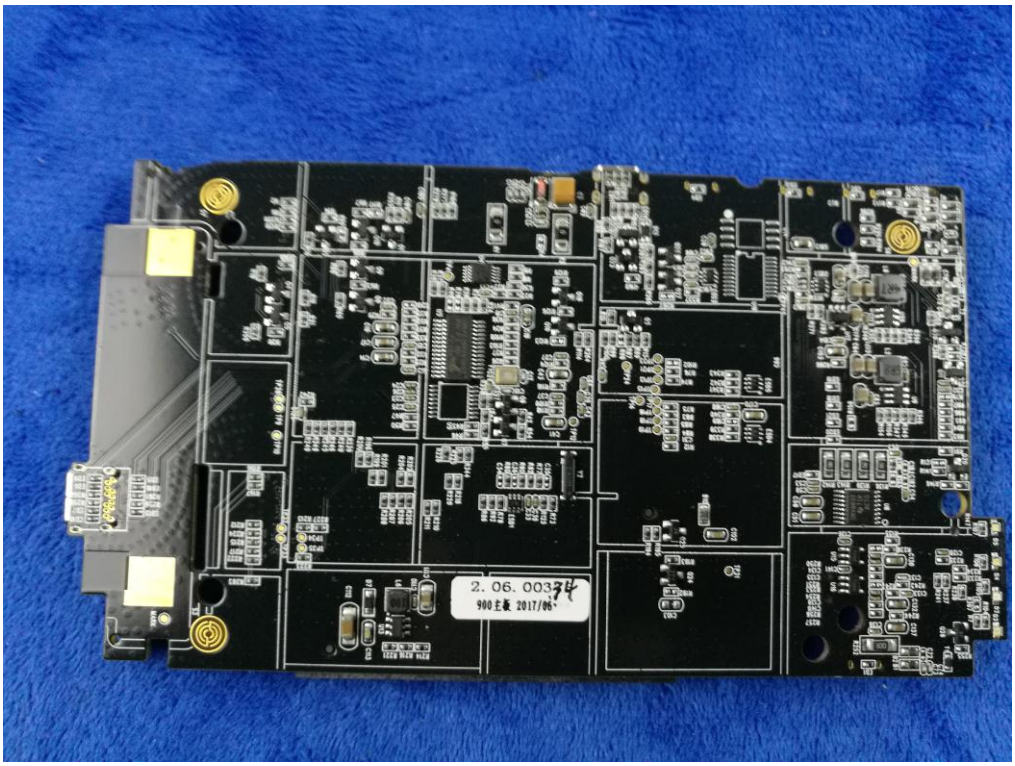
Battery - Front View

Battery - Rear View

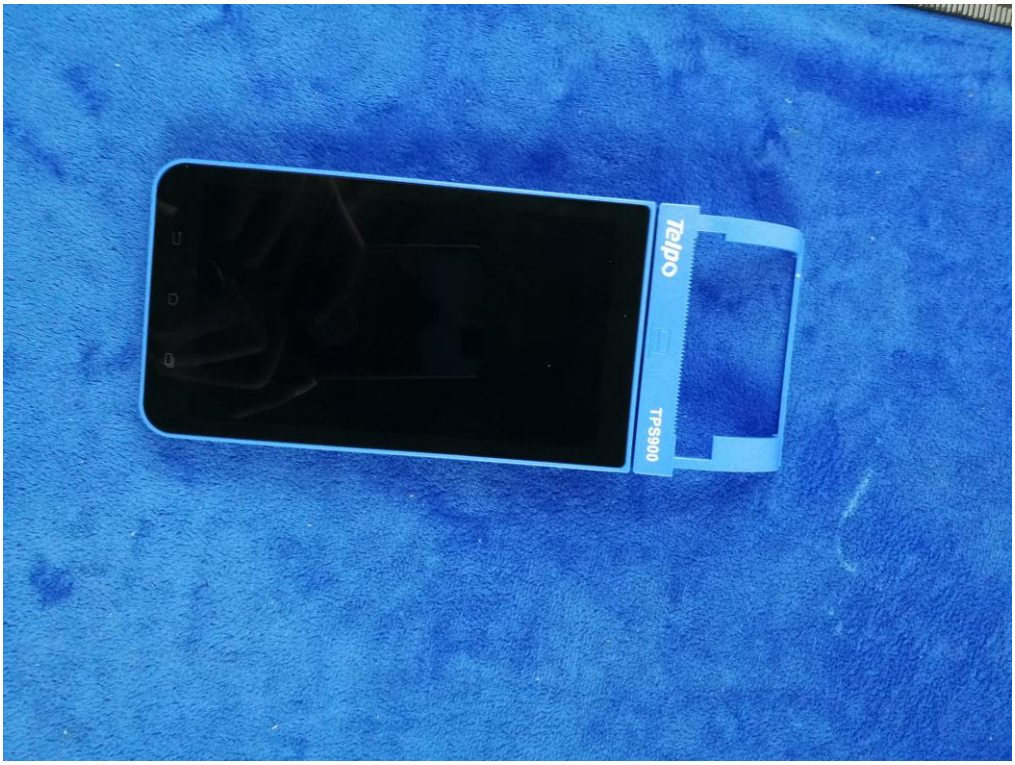
Mainboard with Shielding - Front View

Mainboard without Shielding - Front View

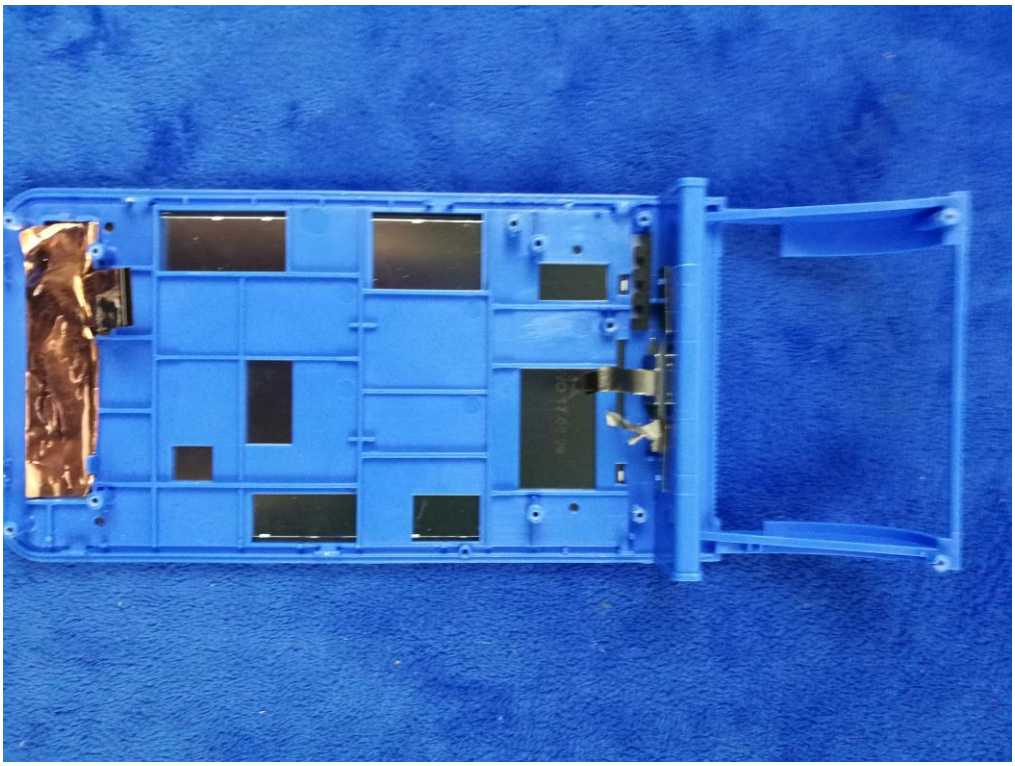
Mainboard – Rear View



LCD – Front View



LCD – Rear View

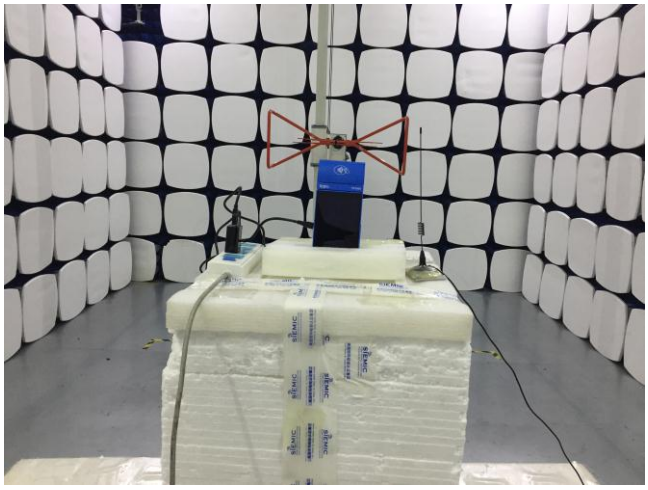
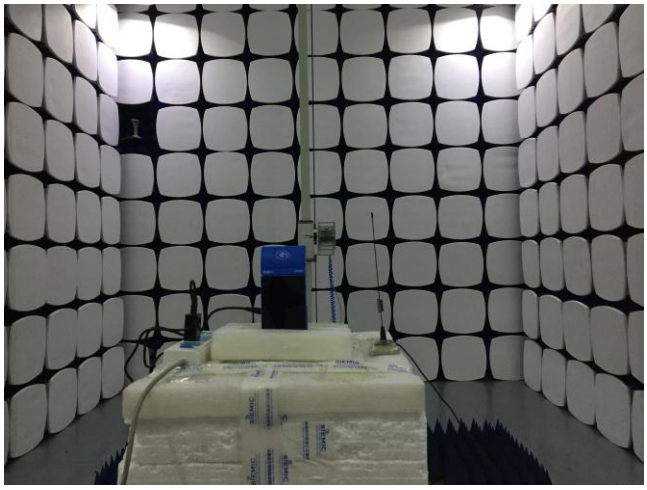


GSM/PCS/UMTS-FDD/LTE Antenna View

WIFI/BT/BLE - Antenna View

GPS - Antenna View

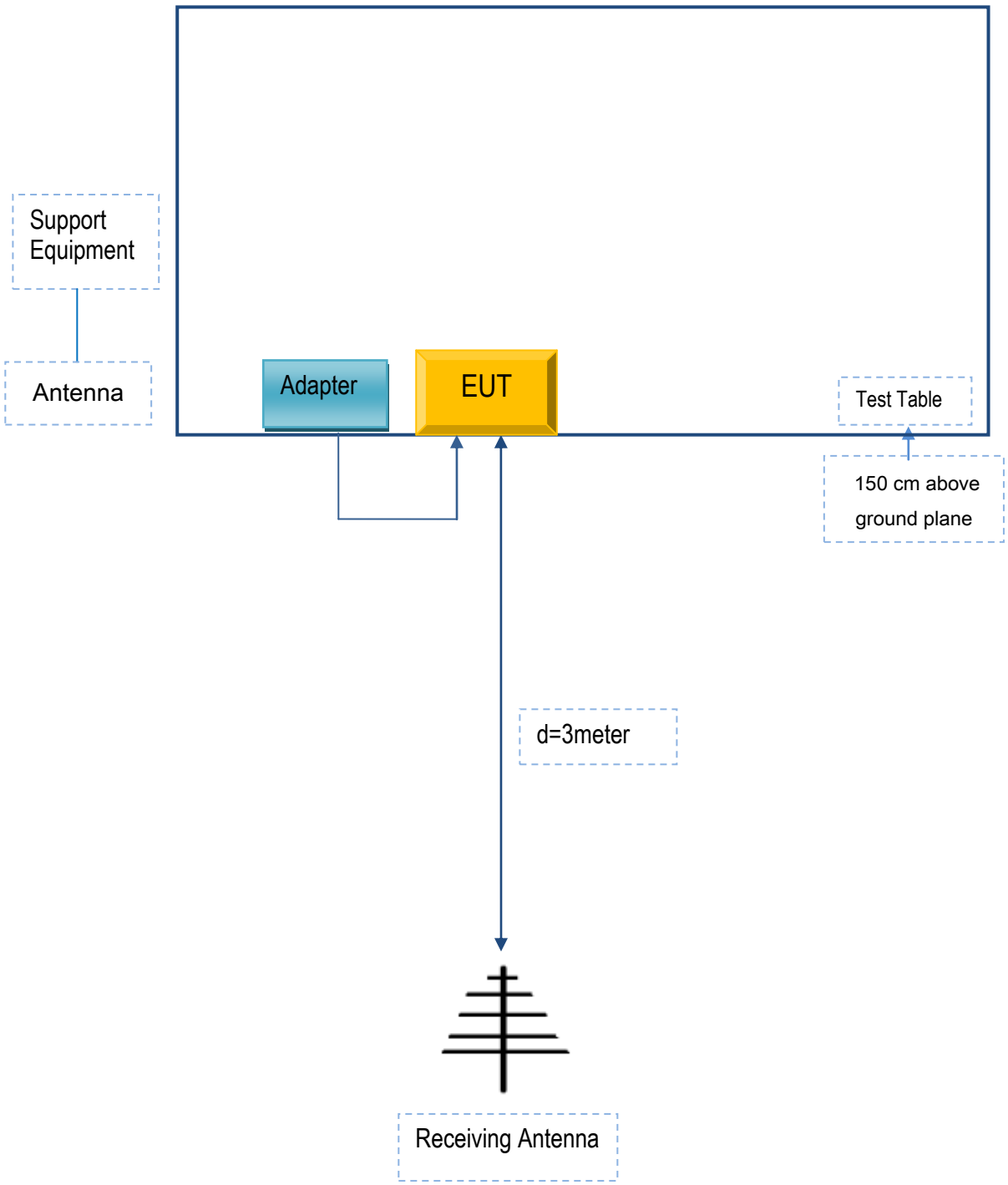
Annex B.iii. Photograph: Test Setup Photo

	
Radiated Spurious Emissions Test Setup Below 1GHz	Radiated Spurious Emissions Test Setup Above 1GHz

Annex C. TEST SETUP AND SUPPORTING EQUIPMENT

Annex C.ii. TEST SET UP BLOCK

Block Configuration Diagram for Radiated Emissions



Annex C. il. SUPPORTING EQUIPMENT DESCRIPTION

The following is a description of supporting equipment and details of cables used with the EUT.

Supporting Equipment:

Manufacturer	Equipment Description	Model	Serial No
Telepower Communication Co., Ltd	Adapter	SC/10WA050200US	N/A

Supporting Cable:

Cable type	Shield Type	Ferrite Core	Length	Serial No
USB Cable	Un-shielding	No	0.8m	N/A

Annex C.ii. EUT OPERATING CONKITIONS

N/A

Annex D. User Manual / Block Diagram / Schematics / Partlist

Please see the attachment

Annex E. DECLARATION OF SIMILARITY

N/A